SYSTEM AND METHOD FOR PROVIDING SUBSCRIBED APPLICATIONS ON WIRELESS DEVICES OVER A WIRELESS NETWORK

BACKGROUND OF THE INVENTION

I. *Field of the Invention*

[0001] The present invention generally relates to data networks and computer communications across the data networks. More particularly, the invention relates to the provision of software applications that require a subscription for authorized use thereof being installed on wireless devices from one or more application download servers on a wireless data network, and the subscription is automatically accounted for on a server-side accounting module until the subscribed application is deleted from the wireless device.

II. *Description of the Related Art*

[0002] Wireless devices, such as cellular telephones, communicate packets including voice and data over a wireless network. Cellular telephones themselves are being manufactured with increased computing capabilities and are becoming tantamount to personal computers and hand-held personal digital assistants ("PDAs"). These "smart" cellular telephone have installed application programming interfaces ("APIs") onto their local computer platform that allow software developers to create software applications that operate on the cellular telephone. The API sits between the wireless device system software and the software application, making the cellular telephone functionality available to the application without requiring the software developer to have the specific cellular telephone system source code.

[0003] The software applications can come pre-loaded at the time the wireless telephone is manufactured, or the user may later request that additional programs be downloaded over cellular telecommunication carrier networks, where the programs are executable on the wireless telephone. As a result, users of wireless telephones can customize their wireless telephones with programs, such as games, printed media, stock updates, news, or any other type of information or program available for download through the wireless network. Some of the software applications are downloadable to the user only if the user has a paid a fee to the provider of the software applications. And in some existing computer networks, software applications are only downloadable if the user subscribes to the use the software application such that the user is billed at periodic intervals for the use of the application.

[0004] The provider typically insures that only authorized users have access to cost-based applications through the provision of licenses within the software application itself. The wireless device API normally checks the software either at the time execution is requested or at some other period to determine if the software is licensed for use on the computer platform of the wireless device. As long as the license is current, the software application can be executed on the platform. However, most software licenses have a finite duration for which they will permit the user to have access to the licensed application. For some applications, the license is of a lasting duration and the user is billed for the application based upon the date when the application was downloaded.

[0005] In existing wireless networks, if the user of the wireless device desires to download and use a subscription-based software application, the user will typically either call a service provider or contact the service provider through other means, such as through an Internet access, and the service provider will either transmit the subscribed application to the wireless device across the wireless network or allow the user access to secure site where the subscription-based application is downloadable or accessible. To end the subscription of the application that has been downloaded to or is accessible from the wireless device, the user typically has to make an affirmative step to end the subscription, such as contacting the service provider from the wireless device, which can be expensive, or waiting until a less expensive connection can be made, such as from a land-based telephone line or an Internet connection.

[0006] Accordingly, it would be advantageous to provide a system and method whereby a subscription-based software application can be downloaded to wireless devices and accounted for by the application provider, while still permitting the user easy removal of the subscription-based application with virtually concurrent cessation of billing for the application subscription. Further, such subscription-based software application should be easily removed from the wireless device without significant action required by the user of the wireless device to contact the software application provider to have the subscription discontinued. It is thus to the provision of such a system and method that can account for the use of subscription-based software applications on wireless devices that the present invention is primarily directed.

SUMMARY OF THE INVENTION

[0007] The present invention is a system and method for the provision of downloadable subscription-based software applications on one or more wireless devices where the applications were downloaded from one or more application download servers across a wireless network. The subscription-based software application can be treated as a regular application resident on

the wireless device, or alternately, the subscription-based application can include a license indicating that the application is subscription-based. An accounting module receives subscription-based application download data from the one or more application download servers for each subscription-based application downloaded by a wireless device, and subscription-based application deletion data from each wireless device that has deleted a subscription-based application. The system includes one or more wireless devices, such as a cellular telephone, personal digital assistant (PDA), pager, or other wireless computer platform. Each wireless device is in selective communication with a wireless network, such as a cellular network, and the wireless device can selectively download one or more subscription-based software applications, such as a game, news feed, stock quotes, or the like, whereby the subscription-based application is installed and executable on the wireless device.

[0008] The system also includes one or more application download servers where each application download server selectively communicates with the one or more wireless devices across the wireless network and, in response to requests from the wireless devices, downloads to wireless devices subscription-based software applications. Each application download server generates application download data for each subscription-based software application downloaded by a wireless device therefrom for tracking which wireless device downloaded which subscription-based application.

[0009] The accounting module, preferably implemented in software, accounts for the use of subscription-based software applications by each wireless device based upon the subscription-based software application download data received from the application download servers and subscription-based application deletion data received from the wireless devices. The accounting module can be resident on either one of the application download servers, the application download server from which a subscription-based software application was downloaded, or on any computer platform on the wireless network or server-side network.

[0010] In one embodiment, upon deletion of a subscription-based software application, the wireless device bridges a communication link with the one or more application download servers and transmits subscription-based application deletion data to the one or more download servers, which in turn transmit the deletion data to the accounting module if the accounting module is not resident on that server. Alternately, the accounting module selectively receives subscription-based application deletion data transmitted directly from a wireless device.

[0011] The invention also includes a method for providing downloadable subscription-based software on the one or more wireless devices in selective communication with one or more application download servers across a wireless network including the steps of selectively

downloading one or more subscription-based software applications from an application download server to a wireless device whereby the subscription-based software is executable on the wireless device, and then generating at the application download server subscription-based application download data for each subscription-based software application downloaded by a wireless device therefrom. The method then includes the steps of selectively transmitting subscription-based application deletion data from each wireless device that has deleted a subscription-based software application to the accounting module, and accounting for the use of subscription-based software applications by each wireless device on the accounting module where the accounting is based upon the subscription-based software application download data and subscription-based application deletion data. The method also further preferably includes the step of, prior to the step of selectively transmitting subscription-based application deletion data from each wireless device, the wireless device bridging a communication link to the one or more application download servers after the wireless device has deleted a subscription-based software application. An example of bridging a communication link is effecting a cellular teleconnection.

[0012] The step of accounting for the use of subscription-based software applications by each wireless device can occur on an accounting module resident on the application download server from which a subscription-based software application was downloaded, on an accounting module resident on an application download server, or on an accounting module located remotely from the application download servers.

[0013] In one embodiment, the method can further include the step of receiving the transmitted subscription-based application deletion data at an application download server and sending the subscription-based application deletion data to the accounting module for the accounting step. Alternately, the step of selectively transmitting subscription-based application deletion data from each wireless device to an accounting module can be selectively transmitting subscription-based application deletion data from each wireless device directly to the accounting module located remotely from the one or more application download servers.

[0014] The invention also provides an accounting module specifically for accounting for the use of the subscription-based software applications by the one or more wireless devices. The accounting is performed primarily based upon subscription-based application download data supplied from each application download server for each subscription-based software application downloaded by a wireless device therefrom, and subscription-based application deletion data supplied from each wireless device that has deleted a subscription-based software application.

[0015] It is therefore the primary object of the present invention to provide a system and method whereby a subscription-based software application can be downloaded to wireless devices from

one or more application download servers, and the wireless devices provides data indicative of deletion of the subscription-based application such that the use of the subscribed applications can be accounted for by the application provider without having to constantly determine if the subscription-based application is present on the wireless device. Further, the user can easily delete the subscription-based application and cause virtually concurrent cessation of billing for the application subscription. The present invention thus provides an advantage to the user of the wireless device in that the subscription-based software application can be easily removed from the wireless device without significant action taken by the user of the wireless device to contact the software application provider to have the subscription discontinued.

[0016] Other objects, advantages, and features of the present invention will become apparent after review of the hereinafter set forth Brief Description of the Drawings, Detailed Description of the Invention, and the Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a representative diagram of a wireless network and the computer hardware and wireless devices that can be used within the inventive system.

[0018] FIG. 2 is a block diagram of the hardware components of the wireless network providing communication between different wireless devices, the application download server, the accounting server, and their respective databases.

[0019] FIG. 3 is a file table resident on the application download server and/or stored application-related database identifying the software applications that are downloaded and/or deleted on specific wireless devices.

[0020] FIG. 4A is a flowchart illustrating the process on a wireless device of downloading and installing a subscription-based software application.

[0021] FIG. 4B is a flowchart illustrating the process at the application download server in transmitting a copy of a subscribed software application to the wireless device, this process in conjunction with the process of FIG. 4A on the wireless device.

[0022] FIG. 5 is a flowchart illustrating the process of the wireless device deleting a subscription-based application and transmitting the subscription-based application deletion data indicative of the deletion to the accounting module, either directly or indirectly.

[0023] FIG. 6 is a flowchart illustrating the accounting module's process of accounting for usage of subscribed software applications based upon the subscription-based application download data and subscription-based application deletion data.

DETAILED DESCRIPTION OF THE INVENTION

[0024] With reference to the figures in which like numerals represent like elements throughout, FIG. 1 illustrates the present inventive system 10 for providing subscribed software applications to one or more wireless devices, such as cellular telephone 12, in communication across a wireless network 14 with at least one application download server 16 that selectively downloads subscribed software applications to the wireless devices across a wireless communication portal or other data access to the wireless network 14. As shown here, the wireless device can be a cellular telephone 12, a personal digital assistant 18, a pager 20, which is shown here as a two-way text pager, or even a separate computer platform 22 that has a wireless communication portal, and may otherwise have a wired connection 24 to a network or the Internet. The inventive system 10 can thus be performed on any form of remote module including a wireless communication portal, including without limitation, wireless modems, PCMCIA cards, access terminals, personal computers, access terminals, telephones without a display or keypad, or any combination or sub-combination thereof.

[0025] The application download server 16 is shown here on a local server-side network 26 with other computer elements in communication with the wireless network 14. There is also shown a stand-alone accounting server 32 and a accounting records database 30 which perform the accounting functions as herein described; however, accounting server 32 and database 30 are not necessary as all server-side functions can be performed on one server, such as application download server 16. Further, any computer server-side computer platform can provide separate services and processes to the wireless devices 12,18,20,22 across the wireless network 14.

[0026] The stored-application-related database 28 preferably contains stored-application related data to include the records for the specific applications downloaded by specific wireless devices 12,18,20,22, from the server through the wireless network 14. The records can then be used to generate the subscription-based download data requisite to bill the users of the wireless devices for the applications downloaded thereto.

[0027] In FIG. 2, a block diagram is shown that more fully illustrates the components of the wireless network 14 and interrelation of the elements of the present inventive system 10. The wireless network 14 is merely exemplary and can include any system whereby remote modules, such as wireless devices 12,18,20,22, communicate over-the-air between and among each other and/or between and among components of a wireless network 14, including, without limitation, wireless network carriers and/or servers. The application download server 16 and the stored application-related database 28, and accounting server 32 and accounting records database 30, and any other components which are needed to provide cellular telecommunication services. The

application download server 16 and/or accounting server 32 communicate with a carrier network 40, through a data link, such as the Internet, a secure LAN, WAN, or other network. The carrier network 40 controls messages (sent as data packets) sent to a messaging service controller ("MSC") 42. The carrier network 40 communicates with the MSC 42 by a network, the Internet and/or POTS ("plain ordinary telephone system"). Typically, the network or Internet connection between the carrier network 40 and the MSC 42 transfers data, and the POTS transfers voice information. The MSC 42 is connected to multiple base stations ("BTS") 44. In a similar manner to the carrier network, the MSC 42 is typically connected to the BTS 44 by both the network and/or Internet for data transfer and POTS for voice information. The BTS 44 ultimately broadcasts messages wirelessly to the wireless devices, such as cellular telephone 12, by short messaging service ("SMS"), or other over-the-air methods known in the art.

[0028] The wireless device, such as cellular telephone 12, has a computer platform 50 that can receive and execute software applications transmitted from the application download server 16. The computer platform 50 includes an application-specific integrated circuit ("ASIC") 52, or other processor, microprocessor, logic circuit, or other data processing device. The ASIC 52 is installed at the time of manufacture of the wireless device and is not normally upgradeable. The ASIC 52 or other processor executes the application programming interface ("API") layer that interfaces with any resident programs in the memory 56 of the wireless device. The memory can be comprised of read-only or random-access memory (RAM and ROM), EPROM, EEPROM, flash cards, or any memory common to computer platforms. The computer platform 50 also includes a local database 58 that can hold applications not actively used in memory 56, such as the subscription-based software applications downloaded from the application download server 16. The local database 58 is typically a flash memory cell, but can be any secondary or tertiary storage device as known in the art, such as magnetic media, EPROM, EEPROM, optical media, tape, or soft or hard disk.

[0029] The wireless device, such as cellular telephone 12, can download subscription-based applications, such as games, news, sports data, stock monitors, and the like, to be held the local database 58 when not in use. The subscription-based software application can be treated as a regular software application resident on the wireless device 12,18,20,22, and the only way to access the application is to obtain a subscription to have download access to the application on the application download server 16. Alternately, the subscription-based application can include a license indicating that the application is subscription-based. The wireless device can then selectively upload stored resident applications, to include subscription-based applications, from the local database 58 to memory 56 for execution on the API 54 when so desired by the user.

The user of the wireless device 12,18,20,22 can also selectively delete a software application from the local database, and if the software application was subscription-based, the application provider for use of the subscribed software application should no longer charge the user. Thus, the deletion of the subscription-based application must be communicated to the accounting module.

[0030] The system 10 uses an accounting module to account for the use of the subscription-based application based upon the date when the wireless device 12,18,20,22 downloaded the application, and the date when the wireless device deletes the software-application. The accounting module, which is preferably a software application that can be a stand-alone module or can be integrated into a larger software application, receives subscription-based application download data from the one or more application download servers, such as server 16, for each subscription-based application downloaded by a wireless device 12,18,20,22, and subscription-based application deletion data from each wireless device 12,18,20,22 that has deleted a subscription-based application. In such manner, the usage of the subscribed application can be billed solely based upon the download date and deletion date of the subscribed application. Although, other downloads and interconnections can be made between the application download server 16 and the wireless device 12,18,20,22, such as updating the application, and such interconnection can update the accounting records database 30. The accounting module can be resident the application download server 16, and specifically the application download server 16 from which a subscription-based software application was downloaded, or can be resident on any computer platform resident on the server-side network 26 or wireless network 14.

[0031] FIG. 3 illustrates a table 60 of the subscription-based application data held resident on the application download server 16 or stored application-related database 28, and which is sent to the accounting module wherever resident in the system 10. The application column 62 holds three software applications, shown here as chess, a golf score keeper, and a stock monitor, and the specific client identification number 64 that has downloaded the particular application. The table 60 also has other client and application related data, such as the client phone number 66, the specific phone model 68, the carrier for telecommunication service 70, and the region of the carrier 72. The table 60 also includes the download date column 74 containing the specific dates the applications were downloaded. The table 60 also includes an optional deletion column 76 such that the application download server can track if the wireless device deleted a specific application, from application column 62. The deletion column 76 includes a single bit wherein 0 indicates that no deletion signal has been received, and 1 indicates that the user has deleted the application. Thus, the stock monitor application in table 60 has been deleted by the wireless

device. The application download server 16 can keep the date of deletion if necessary, but at the least, relays the deletion data to the accounting module so that proper accounting for the duration of the subscription of the application can occur. The table 60 can be held in any relational, entity-relational, or object-oriented database on the application download server 16 or on the stored application-related database 28.

[0032] As shown in FIG. 4A, in operation of the system 10, the wireless device 12,18,20,22 receives a request to subscribe to a software application, as shown at step 80, and then the wireless device transmits a request to the application download server 16, as shown at step 82, to have the application subscribed to and downloaded. The application download server 16, as shown in FIG. 4B, receives the request to download the subscription-based application, as shown at step 94, transmits a copy of the subscription-based application to the wireless device, as shown at step 96. Either at the same time as step 96 or at some time thereafter, the application download server 16 generates the subscription-based application download data, as shown at step 98, and then outputs the subscription-based application download data, as shown as data 100.

[0033] On the wireless device side, a determination is made as to whether the application download server has transmitted the application, as shown at decision 34. If the application has not been sent, then the user is informed of the failure to download the subscription-based application download data, as shown at step 86, and then the download process terminates. Otherwise, if the application download server 16 has sent the subscription-based application at decision 84, then the wireless device 12,18,20,22 receives the subscription-based application, as shown at step 88, and the subscription-based application is installed on the wireless device, as shown at step 90, and the downloaded process terminates. In downloading the application, the wireless device 12,18,20,22 has subscribed to the application and the user/owner of the wireless device will be billed under whatever terms the subscription entails, which is typically a recurrent periodic fee.

[0034] With reference to FIG. 5, when the user desires to remove the subscription-based application from the wireless device 12,18,20,22, the wireless device receives the request from the user to delete the application, as shown at step 110, and then the wireless device deletes the subscription-based application completely from the wireless device, i.e. deleted from local database 58 and memory 56. The wireless device then attempts to transmit, at the same time as step 112 or thereafter, the subscription-based application deletion data to the accounting module, and determines if the transmission as possible, as shown at decision 114. In other words, the wireless device must communicate the fact of the deletion of the application in order to have the user stopped being charged for the subscription, and for example, if the wireless device is out of

the wireless network, then the wireless device must wait until back in network in order to communicate the subscription-based application deletion data. Thus, if the wireless device cannot transmit the deletion data at decision 114, the user is informed of the failure to unsubscribe from the application and the device enters a wait state at decision 114 until the subscription-based application deletion data can be transmitted. Once the deletion data can be transmitted at decision 114, then the subscription-based application deletion data is transmitted from the wireless device, as shown at step 118, and the process terminates with the output of the subscription-based application deletion data, as shown as data 120.

[0035] The accounting method of the accounting module is shown in the flowchart of FIG. 6. The accounting module, wherever resident, receives the subscription-based application download data 100 from one or more application download servers, such as application download server 16, as shown at step 122, and also receives the subscription-based application deletion data 120 from the one or more wireless devices 12,18,20,22, as shown at step 124. The particular order of receipt of the data is irrelevant as long as both data are present so that the accounting process can occur. As shown at step 126, the accounting module then accounts for the usage of subscribed applications by the wireless devices based upon the download date and deletion date for each application. The accounting module then generates billing information for usage of the subscribed applications, as shown at step 128, and then the accounting process terminates. The accounting module perform a wide variety of accounting functions such as generation of simple billing information to full generation of the actual bill to the user/owner of the wireless device.

[0036] In order to transmit the subscription-based application deletion data, the wireless device 12,18,20,22 preferably bridges a communication link to the one or more application download servers, such as application download server 16, such as making a cellular teleconnection to a server. The receiving application download server 16 then forwards the deletion data to the accounting module for processing as shown in FIG. 6. Alternately, the transmission of the subscription-based application deletion data from each wireless device 12,18,20,22 to the accounting module can be direct to the accounting module located remotely from the one or more application download servers, such as a separate accounting server 32.

[0037] In view of the inventive method and module, the present invention includes a program resident in a computer readable medium, where the program directs a wireless device having a computer platform to perform the inventive steps of the method. The computer readable medium can be the memory 56 of the computer platform 50 of the cellular telephone 12, or other wireless device, or can be in a local database, such as local database 58 of the cellular telephone 12. Further, the computer readable medium can be in a secondary storage media that is loadable onto

a wireless device computer platform, such as a magnetic disk or tape, optical disk, hard disk, flash memory, or other storage media as is known in the art.

[0038] In the context of FIGS. 4A-6, the present inventive methods may be implemented, for example, by operating portion(s) of the wireless network 14 to execute a sequence of machine-readable instructions, such as wireless platform 50, the application download servers 16, and accounting server 32. The instructions can reside in various types of signal-bearing or data storage primary, secondary, or tertiary media. The media may comprise, for example, RAM (not shown) accessible by, or residing within, the components of the wireless network 14. Whether contained in RAM, a diskette, or other secondary storage media, the instructions may be stored on a variety of machine-readable data storage media, such as DASD storage (e.g., a conventional "hard drive" or a RAID array), magnetic tape, electronic read-only memory (e.g., ROM, EPROM, or EEPROM), flash memory cards, an optical storage device (e.g. CD-ROM, WORM, DVD, digital optical tape), paper "punch" cards, or other suitable data storage media including digital and analog transmission media.

[0039] While the foregoing disclosure shows illustrative embodiments of the invention, it should be noted that various changes and modifications could be made herein without departing from the scope of the invention as defined by the appended claims. Furthermore, although elements of the invention may be described or claimed in the singular, the plural is contemplated unless limitation to the singular is explicitly stated.